

Supply Chain Integration Capability: An Organizational Routine Perspective

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Abstract - Previous research suggests that the inconsistent results about the relationship between supplier chain integration and performance are due to incomplete and inappropriate conceptualization of supply chain integration dimensions. Therefore, since the resource-based view has been recognized as the most suitable framework to understand these capabilities, we identify and examine routines bundles that make up them. This paper contributes to expand the organizational routines research and provide theoretical guideline for future research in the supply chain management field.

Keywords: *Organizational routines, organizational capabilities, supply chain management, supply chain integration, firm performance*

1. Introduction

Supply chain integration (SCI) is considered an important factor of the supply chain management approach because integration is recognized as an adequate strategy to improve efficiency and effectiveness of supply chain members [1]. SCI enables the coordination of inter and intra processes and activities in such a way that most competitors cannot easily match the advantages obtained [2].

Since integration processes depend more on the degree that coordination activities have become part of the organizational routines [3], recent research propose the use of the resource-based view (RBV) to conceptualize SCI dimensions [4]–[9]. For example, [4] use this approach to examine four packages of routines that make up a supplier management capability. Similarly, [8] understand an internal integration capability through a set of routines that organizations use to obtain inter-functional knowledge and cultivate integration skills. However, studies in which all SCI dimensions

are considered under this approach are still limited.

Accordingly, in this research we develop a conceptualization of the three SCI dimensions based on the organizational routine's perspective. To do that, first we begin with a literature review where we analyse critical aspects of SCI, and then, we suggest that the three SCI dimensions can be decomposed into packages of routines. Therefore, the objective of this paper is to determine and examine the main routines that make up supplier, internal, and customer integration capabilities.

This paper is organized as follows: first, the study of the specialized literature on SCI is presented. Second a conceptualization of supplier, internal, and customer integration as a set of routines is proposed. Finally, we offer some discussion and implications of our findings as well as some recommendation for future research.

2. Literature review

Although researches on SCI have increased considerably in last years, there is still some degree of confusion on its definition. It was difficult to found a fully accepted term to refer to coordination strategies between supply chain members, which put in sight a certain degree of ambiguity about the activities that SCI involve [10]–[12]. As mentioned by [1], this confusion is remained despite the considerable growth in the number of papers published related to the topic, leading to a not widely accepted definition of SCI, and to the emergence of alternative approaches such as Supply Chain Collaboration (SCC).

Accordingly, some authors highlight the differences between SCC and SCI, referring to them as two different ways of managing activities in a supply chains context. [13] argue that SCC and SCI have been used interchangeably because both refer to a coupling process between supply chain partners. However,

on the one hand, the term integration means unified control of similar processes previously carried out independently, which places more emphasis on central control, ownership, and is governed by contracts. On the other hand, the term collaboration puts more emphasis on governance through relationships [14], and it is used in the SCM context to refer as something that happens when two or more independent companies work together to plan and execute supply chain activities with greater success than when they act individually [15].

Conversely, another group of researchers argue that SCI is characterized by cooperation, collaboration, exchange of information, trust, and shared technology. This point of view does not distinguish between SCI and SCC perspective. For example, [2] defined SCI as “the degree to which a manufacturer strategically collaborates with its supply chain partners and collaboratively manages intra- and inter-organization processes” (2010, p.59). Furthermore, [1] carried up a survey to directors of different companies in order to assess the understanding of the terms information sharing, SCI and SCC, and they defined SCI as “Supply chain management integration is the co-ordination and management of the upstream and downstream product, service, financial and information flows of the core business processes between a focal company and its key supplier (and potentially the supplier’s key suppliers) and its key customer (and potentially the customer’s key customers)” (2012, p.496), and argue that the goal of integration is to improve the efficiency and effectiveness of the supply chain processes in order to create value for final customers.

Although some authors have highlighted the importance to differentiate between integration and collaboration activities. We argue that SCI intrinsically consider coordination, cooperation and collaboration activities among supply chain members, which made that the line that separate SCI and SCC unavoidably blurry.

2.1 Dimensions of supply chain integration

Previous research agrees in identifying three dimensions that make up SCI: Internal Integration, supplier Integration, and customer Integration [2]. On the one hand customer and supplier integration are commonly view as external integration and refer to the degree to which a manufacturer partners with its external partners to structure strategies, practices and inter-organizational processes in a collaborative and synchronized manner [16]. On the other hand, internal integration focuses on the activities inside firms, and is defined as the degree to which companies structure its own strategies, practices and processes in a collaborative and coordinated manner [2]. The consideration of SCI dimensions is important for understanding their individual and joint influence

on firm performance, and also how they affect each other [17].

Although the importance of considering the three SCI dimensions in empirical studies have been frequently recognized in the literature, most researchers do not consider this issue. Commonly, some studies focus either on external integration (e.g. [18]–[24]) or on internal integration (e.g. [25], [26]). Therefore, many studies on SCI are incomplete [2]. This aspect has been evidenced in different literature reviews on the topic. For example, [27] conducted a review of the literature from 1990 to 2001, which revealed that researchers tended to focus on the functional activities inside the company, while they very much neglected collaboration among organizations. On the other hand, in their literature review, [28] recognize that this approach has changed since 2003, date from which most of the research proposes a discussion about the inter-organizational relationships, leaving aside the intra-organizational relationships. This finding had also been confirmed by [29].

3. Supplier chain integration from an organizational routine perspective

The resource based view (RBV) is considered an adequate framework for understanding how the company achieves competitive advantages through its resources and capabilities [30]. RBV assumes that companies can be conceptualized as resource bundles, and states that obtaining superior performance is due to the existence of valuable, rare, inimitable and non-substitutable capabilities that allow companies to obtain sustainable competitive advantages [31]. In general, the term resources refer to tangible and intangible assets owned or controlled by firms, while the term capabilities refer to the firm's abilities to implement these resources, which are explained through routines [32]. Therefore, the firm's capabilities emerge from a synergistic interaction between multiple related routines. i.e., the capabilities are built through the identification, development and integration of organizational routines [30].

Organizational routines are described as the way things are done [33]. Routines are repetitive and recognizable patterns of interdependent actions, carried out by multiple actors [34], i.e., routines have a collective nature, which made them to be distributed throughout the organization or along supply chains, making that their actors can belong to different functional areas or even part of different organizations connected by their interaction.

From RBV perspective, both internal integration and external integration can be defined as capabilities [5], [8], [30], [35], [36]. A SCI capability does not reside in an individual routine but emerge from the synergistic interaction between multiple mutually related routines. Therefore, the study of SCI dimensions

based on organizational routines allow to identify recognizable patterns in terms of observable practices that encapsulate the different routines involved in the integration process between firm's functional areas, suppliers and customers. Applying [30] approach of capabilities as set of routines, we identified the following routines that compose each one of the SCI dimensions.

3.1 Routines that make up the capability of internal integration

Internal integration destroys functional barriers and facilitates functional coordination, minimizing process redundancy [37]. Internal integration capability involves aspects that the company directly controls [12], and it is made up of specific organizational routines that are fundamental for the adequate management of the supply chain [38], allowing the coordination of different systems, flows, processes and procedures [8], [39]. Based on the literature and the analysis of different scales used to measure the internal integration levels of the organization in a supply chain context [2], [5], [8], [16], [17], [37], [40]–[50], we identify different patterns that can be grouped into three main routines, which are defined as: Information sharing routines, internal process integration routines, cross-functional routines.

Information sharing routines

Information sharing routines refers to the exchange of key information throughout the firm functional areas in order to achieve an appropriate decision making process [51]. High levels of information exchange among the different departments require communication activities that allow to share the adequate information at the right time, allowing functional areas obtain a broader picture of the organization processes and objectives, which improve the use of resources [46].

Internal process integration routines

Process integration routines refer to activities that aim to link key business processes, reducing the redundancy inside the firm [52]. Since firm's functional areas can pursue crossed objectives, a low process integration level causes failures in the use of resources and knowledge, originating redundancy of efforts and waste of resources [16].

Cross-functional routines

The use of cross-functional teams is recognized as one of the most common practices to foster links inside the firm [47]. The goal of these teams is to increase collaboration between employees of different functional areas in order to achieve mutual benefits. Therefore, they decentralize decision making process, which increases internal integration. "Cross-functional teams are typically employed to achieve the integration needed across internal functions to ensure that

quality or innovation objectives are realized (see e.g., [53]–[55]" [78, p.526].

3.2 Routines that make up the capability of supplier integration

Recent research suggests the use of a routine-based approach to understand how the firm manages its suppliers [4]. Supplier integration includes activities such as joint product development, information-sharing, and process coordination [4], [56]. Based on our literature review, and the analysis of different measurement scales used to measure the levels of supplier integration in a supply chain context [4], [8], [23], [37], [40], [44], [57]–[61], we identified activities and patterns that were grouped into four main routines, which we will call: assessment routines, information-sharing routines, process coordination routines, and joint product routines with suppliers.

Assessment routines

Assessment routines help to identify the potential suppliers with which the firm can integrate. A continuous evaluation system unmask opportunism behaviour and increase the leverage of new opportunities [4]. Therefore, high levels of supplier integration require the assess of supplier skills in terms of quality, delivery, capabilities, and process compatibility, among others [62]. For example, [23] suggested that to achieve successful integration a detailed supplier assessment should be carried out, including aspects such as a selection of the appropriate supplier, complementarity of capabilities, cultural aspects, and integration processes.

Information-sharing routines with suppliers

Information-sharing routines involve to share different kind of data and knowledge with main suppliers. For example, inventory levels, demand forecasts, production plans, product traceability, and technical characteristics of products [36], [63], [64]. Information sharing should be frequent and bidirectional [65], and can be made by meetings, via telephone, mail, and via the interchange of electronic data.

Process coordination routines with suppliers

Process coordination routines improve the coordination and structure of the relationship between firm and suppliers, allowing future problems to be understood, external knowledge to be incorporated into current planning decisions, and proactive management of opportunities and threats to physical flows [36]. Process coordination minimize redundant efforts, and enables joint efforts to lower costs, improve quality, and leverage resources [42], [26].

Joint development routines with supplier

The degree of supplier integration is recognized to be high when buyers and suppliers work

together in co-development tasks. For example, the supplier involvement in firm's new product development projects reduces time and cost of new product and enhances quality [64]. For example, joint product development is a key aspect of supplier integration capability since it ensures adequate raw material and expand firm resource in order to meet new customer requirements.

3.3 Routines that make up customer integration capability

The ability to integrate with customers can be defined as a set of routines that a company uses to coordinate processes and solve problems jointly with its key customers. Integration with customers includes activities such as information sharing, joint product development, and product and service performance feedback [66], [67]. Based on the literature and the analysis of different measurement scales used to measure the levels of customer integration in the supply chain context [2], [5], [17], [24], [26], [40]–[42], [44], [46], [49], [60], we identified activities and patterns that were grouped into three main routines, which we call: information-sharing routines, process coordination routines, and joint development routines with customers.

Information sharing routines with customers

Routines for information sharing with customers allow firms to understand their business environment. Usually, the information shared is related to product demand, customer preferences, promotions, and need for new products [68], allowing a better understanding of market expectations and the detection of new opportunities.

Process coordination routines with customers

The process coordination routines allow the synchronization of the activities between firm and main customers, allowing to share responsibilities and jointly solve unexpected problems [69]. In order to improve coordination with customer, firms can work together with them on planning and problem solution activities, enabling both parties to benefit from their business relationship.

Joint development routines with customers

Joint development routines are related to the participation of customer in the improvement or development of new products. This routine is crucial for firm adaptation, since customer commonly known market trends and can offer technical support, which allow to understand and satisfy future demands [66], [70].

Table 1 summarizes the SCI capabilities and routines and shows some examples of observable pattern for each identified routine.

Table 1. Supply chain integration capabilities and routines

SCI DIMENSIONS	ROUTINES	REPETITIVE AND RECOGNIZABLE PATTERNS
Internal integration capability	Internal sharing information	1. Operational and tactical information is regularly exchanged between functional teams [46]. 2. We freely communicate information about our successful customer experiences across all business functions [45]. 3. Within our plant, we emphasize information flows among purchasing, inventory management, sales, and distribution departments [16].
	Internal process coordination	1. Within our plant, we emphasize physical flows among production, packing, warehousing, and transportation departments [16]. 2. The utilization of periodic interdepartmental meetings among internal functions [49]. 3. All functional teams use common product roadmaps and other procedures to guide product launch [46].
	Cross-functional teams	1. The use of cross-functional teams in process improvement [49]. 2. The use of cross-functional teams in new product development [49]. 3. Cross-functional teams, which are temporary bodies set up to facilitate interdepartmental collaboration on a specific project [41].
Supplier integration capability	Information sharing with supplier	1. We share sensitive information (financial, production, design, research and/or competition) with our suppliers [24]. 2. Suppliers are provided with any information that may help them [24]. 3. We exchange information with our key suppliers frequently, formally and/or informally and in a timely manner [24]. 4. We always keep our key supplier informed about events or changes that may affect them [24].
	Process coordination with suppliers	1. We engage in structured joint problem solving with suppliers [4]. 2. We synchronize our activities with those of key suppliers [46]. 3. My firm and his supplier conduct joint planning to anticipate and resolve operational problems [14].
	Joint developments with suppliers	1. Work with suppliers to improve inter-organizational processes [8]. 2. My company works with suppliers to drive out waste in supply chain processes [42]. 3. We help our major supplier to improve their process to better meet our needs [2]. 4. We work jointly with suppliers to identify and capture new market opportunities [71].

	Assessment of suppliers	1. We use quantitative measures of supplier performance [4]. 2. We use qualitative measures of supplier performance [4].
Customer integration capability	Information sharing with customers	1. We share sensitive information (financial, production, design, research and/or competition) with our customers [24]. 2. We exchange information with our key customers frequently, formally and/or informally and in a timely manner [24]. 3. Our key customers always keep us informed about events or changes that may affect us [24].
	Process coordination with customers	1. We synchronize our activities with those of key customers [46]. 2. We have clearly defined roles and responsibilities for managing customer relationships [46]. 3. We work with customers to develop a joint sales forecast that is used as the basis for replenishment [41].
	Joint product development with customers	1. Our customers are involved in our product development processes [44]. 2. Our customers involve us in their quality improvement efforts [44].

4. Discussion

In this research, we identify some issues about the understanding of SCI. Due the emergence of alternative approaches such as SCC, it was found in the literature review some confusion about the activities and processes that SCI encompasses. Nevertheless, trying to avoid this issue, we argue that SCI intrinsically considers coordination, cooperation and collaboration activities among supply chain members, which can be carried out from a contractual and/or relational point of view. i.e., from our understanding, SCI involves collaborative activities between a focused firm, its main suppliers, and its main customers. We do not think that there are significant differences between this approach and the collaboration activities proposed by SCC. Therefore, we define *SCI as the degree to which a company strategically collaborates and cooperates with other members of the supply chain, improving the flow of products, services, information, money and decisions through the supply chain, achieving a coordinated management of intra and inter organizational processes, which increase their efficiency and effectiveness.*

Second, regarding the theoretical framework used to conceptualize SCI, it was noted that recent researches have proposed the resource-based view (RBV) framework as the most appropriate. From this perspective, both internal integration and external integration can be defined as capabilities [5], [8], [30], [36]. Therefore, based on the definition of capabilities as a set of routines proposed by [30], in this research we propose the definition of internal and external integration as follow: *Internal integration as a set of routines to carry out intra-organizational collaboration and cooperation activities, in order to improve the coordination of the flows of information, material, financial and*

the decision-making process among the different functional departments of the organization, and external integration as a set of routines to carry out collaborative and inter-organizational cooperation activities, in order to improve the coordination of the flow of information, materials, financial, and the decision-making process between the organization and its main suppliers and / or customers. We proposed that internal integration routines can be classified into internal sharing information, process coordination, and cross-functional. Supplier integration routines can be classified as assessment, sharing information, process coordination, and joint development with supplier. Finally, customer integration routines can be classified as sharing information, process coordination, and joint development with customer.

5. Conclusion

This research brings into light some important aspects to better understand the concept of SCI. Using an organizational routine's perspective; we determine the main routines that make up supplier, internal, and customer integration capabilities

Our conceptualization of SCI suggests that each SCI dimension plays a different role in the SCM. Internal integration recognizes that firm functional areas should work together as part of an integrated process, and empirical evidences show a direct effect of this capability on different performance indicators, which highlight its role as the most crucial SCI dimension, not only by its effect on firm performance, but also for its effects on the suppliers and customers integration. On the other hand, external integration recognizes the importance of establishing close and interactive relationships with customers and

suppliers. Its relationship with firm performance is more unclear and would depend on environmental dynamism. i.e., the more dynamic the environment the higher the need of external integration. Therefore, it would be critical that future research will consider all dimensions of SCI and how each of them impact specific firm performance indicators.

Finally, since capabilities reside mainly in the organizational routines that are intrinsically intangible and originate from activities undertaken by people, requiring social interactions for the continuous evolution of knowledge, the SCI routine-based approach proposed in this research allows us to change the focus of analysis from the organizational tangible resources, such as information technology systems, to intangible resources such as the way in which the organization performs its integration processes. We hope that the proposed framework would contribute to the understanding of the different routines and capabilities related to SCI and would be used as a guideline to future research, as well as for managers to promote the development of these capabilities in their companies.

Acknowledgements

This research is part of the Project ECO2015-71380-R funded by the Spanish Ministry of Economy, Industry and Competitiveness and the State Research Agency. Co-financed by the European Regional Development Fund (ERDF).

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